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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/077,601

02/15/2002

Pengfei Wu

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EXAMINER

ANGEBRANNDT, MARTIN J

ART UNIT

PAPER NUMBER

1795

MAIL DATE

DELIVERY MODE

06/04/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/077,601	Applicant(s) WU ET AL.	
	Examiner Martin J. Angebrannt	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 February 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 7 and 33-65 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 7 and 33-65 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

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1. The response of the applicant has been read and given careful consideration.

Responses to the arguments of the applicant are presented after the first rejection to which they are directed. Rejections of the previous action, not repeated below are withdrawn based upon the arguments and amendments to the claims.

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 7,33-40,42-57 and 59-65 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wu et al., "Transient biphotonic holographic grating in photoisomerizative azo materials", Phys. Rev. B, Vol. 57(7) pp. 3874-3880 (02/1998), in view of Natansohn et al., "Azobenzene containing polymers: digital and holographic storage" TECHNICAL REPORT 19960924 052 US Navy (09/1996), Jager et al., "Bicolor surface reliefs in azobenzene side chain polymers", Appl. Opt., Vol. 40(11) pp. 1776-1778 (04-2001), Hattemer et al., "synthesis and characterization of novel multifunctional materials obtained via reactive precursor polymers", Macromol. Vol. 33 p 1972-1977 (2000) and "Polymer Chemistry: the glass transition" updated 07/11/2000. <http://faculty.uscupstate.edu/llever/Polymer%20Resources/GlassTrans.htm>.

Wu et al., teach PMMA/methyl yellow or ethyl orange/polyvinyl alcohol polymer compositions formed as coatings. (right column, 3876). An experiment is conducted where the 488 nm line of an Argon ion laser was either s, p or circularly polarized and the writing and probe HeNe laser beams are all s polarized. Figure 7 shows that the decay in

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diffraction efficiency is slow, on the order of minutes (600+ seconds). The red beam is diffracted for detection (right column, page 3878).

Jager et al., "Bicolor surface reliefs in azobenzene side chain polymers", Appl. Opt., Vol. 40(11) pp. 1776-1778 (04-2001) teach polymer compositions with side chain polymers having the chemical structure shown in figure 1, which are coated on a glass slide and two s-polarized red laser beams (645 nm) were used together with a blue (488 nm) laser which was either p or s polarized. This grating is disclosed with respect to figure 3 as being stable for several days. (page 1777). The effects of the differently polarized light are shown in figure 4. The abstract describes the use of blue (488 nm) laser light to irradiate the sample, followed by the use of two red beams to inscribe the grating. The blue beam is in the p polarization (left column, page 1777) and the red beams are in the s- polarization. (page 1776, right column). See also page 1777-1778 and figure 4. Figure 3 shows the gratings formed is relatively stable over the period of 50+ hours. The poling is photoinduced by the first beam.

Natansohn et al., "Azo-benzene containing polymers: digital and holographic storage" TECHNICAL REPORT 19960924 052 US Navy (09/1996) teaches that the higher the Tg of the polymer, the higher the stability of the written information as the oriented azobenzene groups frozen in their orientation (abstract and pages 2 and 5).

Hattemer et al., "synthesis and characterization of novel multifunctional materials obtained via reactive precursor polymers", Macromol. Vol. 33 p 1972-1977 (2000) teaches that use of systems where the Tg is in the 60-194 degree C range. (abstract). In addition to the PR grating, an isomerization grating is formed. (page 1976, left column).

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“Polymer Chemistry: the glass transition” updated 07/11/2000.

<http://faculty.uscupstate.edu/llever/Polymer%20Resources/GlassTrans.htm> (3 pages)

teaches the glass transition for PVA to be 85 degrees C and for PMMA to be 105 degrees C. (page 3 of 3)

It would have been obvious to one skilled in the art to modify the examples of Wu et al., “Transient biphotonic holographic grating in photoisomerizative azo materials”, Phys. Rev. B, Vol. 57(7) pp. 3874-3880 (02/1998) to make a stable grating, similar to that of Jager et al., “Bicolor surface reliefs in azobenzene side chain polymers”, Appl. Opt., Vol. 40(11) pp. 1776-1778 (04-2001) by using PVA and PMMA with high Tg temperatures, such as the 85 degrees C and the 105 degrees C taught by “Polymer Chemistry: the glass transition” updated 07/11/2000.

<http://faculty.uscupstate.edu/llever/Polymer%20Resources/GlassTrans.htm> to make the gratings more stable based upon the teachings of Natansohn et al., “Azobenzene containing polymers: digital and holographic storage” TECHNICAL REPORT 19960924 052 US Navy (09/1996) and Hattemer et al., “synthesis and characterization of novel multifunctional materials obtained via reactive precursor polymers”, Macromol. Vol. 33 p 1972-1977 (2000) that useful Tg are within the range of 60-194 degrees C and that higher Tg prevent the reorientation of the azo dyes.

4. Claims 7,33-40,42-57 and 59-65 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wu et al., “Transient biphotonic holographic grating in photoisomerizative azo materials”, Phys. Rev. B, Vol. 57(7) pp. 3874-3880 (02/1998), in view of Natansohn et al., “Azobenzene containing polymers: digital and holographic storage” TECHNICAL REPORT 19960924 052 US Navy (09/1996), Jager et al.,

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“Bicolor surface reliefs in azobenzene side chain polymers”, Appl. Opt., Vol. 40(11) pp. 1776-1778 (04-2001), Hattemer et al., “synthesis and characterization of novel multifunctional materials obtained via reactive precursor polymers”, Macromol. Vol. 33 p 1972-1977 (2000) and “Polymer Chemistry: the glass transition” updated 07/11/2000. <http://faculty.uscupstate.edu/llever/Polymer%20Resources/GlassTrans.htm>., further in view of Wu et al. “transient optical modulation with a disperse red 1 doped film”. Appl. Opt., Vol. 39(5) p. 814-817 (02/2000).

Wu et al. “transient optical modulation with a disperse red 1 doped film”. Appl. Opt., Vol. 39(5) p. 814-817 (02/2000) (cited 4/22/05) teaches the recording of a biphotonic grating using two s polarized beams from a krypton ion laser (647 nm) which overlap with a s polarized beams of a HeCd laser (442 nm) (page 815, left column).

To address then embodiments bounded by the claims, but not anticipated above, the examiner cites Wu et al., “Transient biphotonic holographic grating in photoisomerizative azo materials”, Phys. Rev. B, Vol. 57(7) pp. 3874-3880 (02/1998) who teaches the use of the red (633 nm) laser for the readout and holds that it would have been obvious to use the same technique in the processes rendered obvious by the combination of Wu et al., “Transient biphotonic holographic grating in photoisomerizative azo materials”, Phys. Rev. B, Vol. 57(7) pp. 3874-3880 (02/1998) with Natansohn et al., “Azobenezene containing polymers:digital and holographic storage” TECHNICAL REPORT 19960924 052 US Navy (09/1996), Jager et al., “Bicolor surface reliefs in azobenzene side chain polymers”, Appl. Opt., Vol. 40(11) pp. 1776-1778 (04-2001), Hattemer et al., “synthesis and characterization of novel multifunctional materials obtained via reactive precursor polymers”, Macromol. Vol. 33

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p 1972-1977 (2000) and “Polymer Chemistry: the glass transition” updated 07/11/2000.

<http://faculty.uscupstate.edu/llever/Polymer%20Resources/GlassTrans.htm>. to determine the diffraction efficiency based upon this laser already being part of the apparatus.

Further, it would have been obvious to use circularly polarized argon ion laser in place of the p polarized laser based upon the direction in the left hands column of page 3879 of Wu et al. with a reasonable expectation of forming a useful non-volatile holographic grating.

The argued position fails to account for the data in Wu figure 7 of Wu which show a certain equivalence in the short wavelength polarization. While not the best, it does not teach away by indicating that it does not work. The issue seems to be one of T_g and the secondary references address this, specifically that the higher the T_g, the more stable the medium.

5. Claims 7,33-40,42-57 and 59-65 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wu et al., “Transient biphotonic holographic grating in photoisomerizative azo materials”, Phys. Rev. B, Vol. 57(7) pp. 3874-3880 (02/1998) and Todorov et al., “Polarization Holography. 1: A new high efficiency organic materials with reversible photoiniduced birefringence”, Appl. Opt. Vol. 23(23) pp. 4309-4312, in view of Jager et al., “Bicolor surface reliefs in azobenzene side chain polymers”, Appl. Opt., Vol. 40(11) pp. 1776-1778 (04-2001), Hattemer et al., “synthesis and characterization of novel multifunctional materials obtained via reactive precursor polymers”, Macromol. Vol. 33 p 1972-1977 (2000), Choi “effect of temperature on photoinduced reorientation of azo benzene chromophore in the side chain copolymers’> Bull. Korean Chem. Soc., Vol. 20(9) pp. 1010-1016 (1999) and “Polymer Chemistry: the

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glass transition” updated 07/11/2000.

<http://faculty.uscupstate.edu/llever/Polymer%20Resources/GlassTrans.htm>.

Todorov et al., “Polarization Holography. 1: A new high efficiency organic materials with reversible photoinduced birefringence”, Appl. Opt. Vol. 23(23) pp. 4309-4312 teaches the recording of holograms using a 0.06 wt% methyl orange azo dye in PVA. (page 4310, left column). These are written using a 488 nm light and probed using a HeNe laser (633 nm) (page 4310, left column).

Choi, “Effect of temperature on photoinduced reorientation of azo benzene chromophore in the side chain copolymers”, Bull. Korean Chem. Soc., Vol. 20(9) pp. 1010-1016 (1999) teaches that the stability of high T_g polymers is better than that of low T_g polymers (page 1014, left column). The teachings that the azo dye disperse red 1 acts as a plasticizer and lowers the T_g of the polymer is disclosed (page 1015, right column).

It would have been obvious to one skilled in the art to modify the composition of Wu et al., “Transient biphotonic holographic grating in photoisomerizable azo materials”, Phys. Rev. B, Vol. 57(7) pp. 3874-3880 (02/1998) by using less of the azo dye to increase the T_g based upon the teaching by Choi, “Effect of temperature on photoinduced reorientation of azo benzene chromophore in the side chain copolymers”, Bull. Korean Chem. Soc., Vol. 20(9) pp. 1010-1016 (1999) and thereby increase the stability as taught by Hattemer et al., “synthesis and characterization of novel multifunctional materials obtained via reactive precursor polymers”, Macromol. Vol. 33 p 1972-1977 (2000), Choi “effect of temperature on photoinduced reorientation of azo benzene chromophore in the side chain copolymers”, Bull. Korean Chem. Soc., Vol. 20(9) pp. 1010-1016 (1999) with a reasonable expectation of forming a grating based

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upon the teaching of Todorov et al., "Polarization Holography. 1: A new high efficiency organic materials with reversible photoinduced birefringence", Appl. Opt. Vol. 23(23) pp. 4309-4312 who forms a grating with a lower azo dyes concentration with motivation from Jager et al., "Bicolor surface reliefs in azobenzene side chain polymers", Appl. Opt., Vol. 40(11) pp. 1776-1778 (04-2001) who teaches stabilized gratings, noting that Tg of PVA and PMMA taught by "Polymer Chemistry: the glass transition" updated 07/11/2000. <http://faculty.uscupstate.edu/llever/Polymer%20Resources/GlassTrans.htm>. which are in the useful range taught by Hattemer et al., "synthesis and characterization of novel multifunctional materials obtained via reactive precursor polymers", Macromol. Vol. 33 p 1972-1977 (2000).

A difference between the teachings of the instant specification and the Wu et al., "Transient biphotonic holographic grating in photoisomerizative azo materials", Phys. Rev. B, Vol. 57(7) pp. 3874-3880 (02/1998) seems to be the concentration of the azo dye. In the instant application the dye concentration is lower and the intensity of the exposure is higher for both laser sources. It is not clear if the Tg is lowered significantly by the use of the 5wt% of the azo dyes by Wu et al., "Transient biphotonic holographic grating in photoisomerizative azo materials", Phys. Rev. B, Vol. 57(7) pp. 3874-3880 (02/1998), but based upon the teachings of Choi "effect of temperature on photoinduced reorientation of azo benzene chromophore in the side chain copolymers", Bull. Korean Chem. Soc., Vol. 20(9) pp. 1010-1016 (1999) it appears that this might be the case. The other issue is one of what movements of the azo dyes are frozen out in the inventive process. Is it the reorientation of the azo dye alone or both the reorientation of the dye and the isomerization of the dye. In Wu et al. "transient optical modulation with a disperse red 1

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doped film”. Appl. Opt., Vol. 39(5) p. 814-817 (02/2000) (cited 4/22/05) there is a discussion with respect to figure 1, relating to the effect of blocking the blue beam alone, which seems to relate to figure 7 of the instant specification.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Martin J. Angebrannt whose telephone number is 571-272-1378. The examiner can normally be reached on Monday-Thursday and alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Mark Huff can be reached on 571-272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Martin J Angebrannt/
Primary Examiner, Art Unit 1795

Martin J Angebrannt

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Primary Examiner
Art Unit 1756

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